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Montana Fish, Wildlife & Parks

Elk Brucellosis Surveillance Preliminary Summary

Winter 2013-2014

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Montana Fish, Wildlife and Parks (MFWP) is conducting a multi-year targeted surveillance and research effort evaluating the prevalence and spatial extent of brucellosis exposure in southwest Montana elk populations. This effort consists of capturing and testing elk in areas adjacent to the previously understood distribution of brucellosis in wildlife to better elucidate the geographic distribution and level of exposure of the disease. Epidemiologic and animal movement data, which is improving our understanding of factors that may influence prevalence and distribution of brucellosis in elk populations, is also being gathered. This information provides support for decisions regarding elk to livestock transmission risk management in areas where elk harbor brucellosis. The use of blood samples from hunter-harvested elk to obtain information about brucellosis was scaled back due to limited hunter participation and concern that samples collected in the fall may not indentify high risk winter and spring transmission areas for *Brucella abortus*. Hunter harvest samples are still utilized in areas where capture efforts are not occurring and/or additional information is needed. This report is a

preliminary summary of the surveillance portion of targeted surveillance and research project.

Statewide surveillance for brucellosis included the collection of blood kits from hunter-harvested elk during the general hunting season (hunting districts 317, 704 and 705), late season management hunts (hunting districts 360, 362, and 560), and the collection of blood from elk captured as part of a research project in hunting districts 204 and 240. Test results are pending for many of these efforts. As a result, this information will be presented at a later date. In addition, more detailed reports regarding animal movements and brucellosis epidemiology investigations will follow, once that data has been obtained.

Study Areas and Methods

Elk from portions of hunting districts 311 and 320 were captured and tested for exposure to *B. abortus* during February, 2014. Surveillance within hunting district (HD) 320 consisted of 2 study areas: the southwestern Tobacco Roots near Sheridan, MT and the southeastern Tobacco Roots north of Ennis, MT. Hunting district 311 was also divided into two study areas: the area east of the Madison River near the Blacks Ford fishing access site (Black's Ford), and the area north and west of the Madison River near Red Mountain (Red Mountain) (Figure 1).

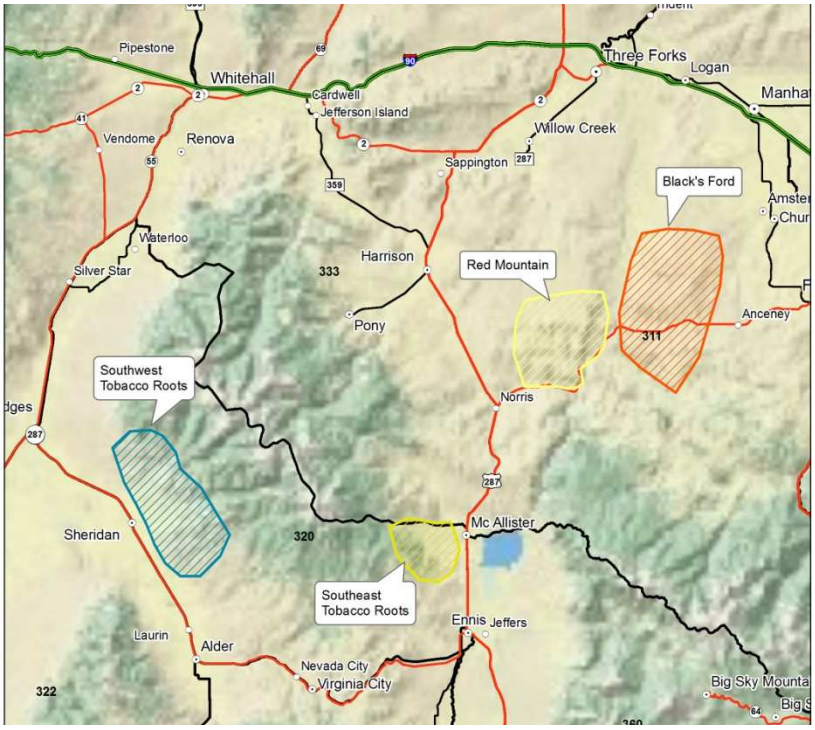

Figure 1. General capture locations for the 2013-2014 targeted elk brucellosis surveillance and research project.

Elk in the HD 320 and HD 311 study areas were captured through the use of a net gun fired from a helicopter. Captured elk were blindfolded, hobbled, placed in a bag and transported to a nearby ground crew for processing. A blood sample was collected at the processing site and centrifuged in a portable lab in order to collect the serum. Serum was screened in the field for exposure to *B. abortus* utilizing the Card and Fluorescence Polarization (FP) tests. Elk were held until screening results from either the Card or both the Card and FP were obtained. While testing was being conducted, the processing crew monitored temperature, collected age information based on tooth eruption and wear techniques, evaluated body fat utilizing an ultrasound, collected fecal samples, and placed identifiable ear tags in each ear. A GPS based radio collar was placed on approximately every 3rd seronegative elk captured. Elk identified as being seropositive in the field (positive on blood tests conducted at the capture site) were fitted with a GPS based radio collar and examined for pregnancy by rectal palpation or the use of an ultrasound. If pregnant, they received a vaginal implant transmitter (VIT) in order to determine when and where an abortion or live birth will occur. The Card test was performed on all captured elk. The FP test requires a lengthy set-up process, is sensitive to temperature fluctuations, and takes longer to perform. Occasionally elk would arrive at the processing site before the FP test was set up, or would arrive with elevated temperatures. When the FP was not ready, or if it was deemed necessary to release elk due to elevated body temperatures, only the Card test was used to assess sero-status prior to releasing the elk. All elk were released at the processing site.

Serum samples from all elk were also tested at the Diagnostic Laboratory after completion of the capture operation. Serum submitted to the Montana Department of Livestock Diagnostic Laboratory (Diagnostic Laboratory) was screened for antibodies against exposure to *Brucella abortus*. Samples were screened utilizing the Rapid Automated Presumptive (RAP), Standard Plate (SPT), Rivanol (Riv), Buffered Acidified Plate Antigen (BAPA), and FP tests. Suspect or reactors to these screening tests were further tested with the Card and Complement Fixation (CF) tests. Final determination of sero-status was based on test results from the Diagnostic Laboratory.

Results and Discussion

Seventy adult female elk ($\geq$1 years old) were captured and tested for exposure to *B. abortus* in HD 320. Thirty-three and 37 were captured in the southeastern and southwestern Tobacco Roots study areas, respectively. All of the elk captured in the Tobacco Roots tested negative for exposure to *B. abortus* both in the field and by testing performed by the Diagnostic Laboratory (Table 1).

Sixty adult female elk were captured and tested in HD 311. Forty and 20 were captured in the Black's Ford and Red Mountain study areas, respectively. Nine of the 40 elk tested in the Black's Ford area were positive for exposure to *B. abortus*. One of the 20 elk tested in the Red Mountain area was positive for exposure to *B. abortus* (Table 1).

Table 1. Elk captured and tested in the southern Tobacco Roots and in HD 311 during the winter of 2013-2014 as part of an elk brucellosis surveillance and research project. Blood serum was tested to evaluate exposure rates (seroprevalence).

Study Area	Number tested	Number Positive	Seroprevalence
Southwestern Tobacco Roots (HD 320)	37	0	0%
Southeastern Tobacco Roots (HD 320/333)	33	0	0%
Black's Ford (HD 311)	40	9	22.5%
Red Mountain (HD 311)	20	1	5.0%

Field testing correctly identified 6 of 10 samples considered seropositive from testing completed at the Diagnostic Lab. Of the 4 that were incorrectly identified in the field, the results were based solely on the Card test (Table 2). The result from one of these Card tests was considered to be inconclusive due to excessive agglutination. This elk was radio-collared as a possible seropositive animal and ultimately tested positive for exposure to *B. abortus* at the Diagnostic Laboratory. An additional seropositive elk received a radio collar by chance. Two of the elk incorrectly identified as being seronegative in the field did not receive radio collars: one in the Red Mountain area and one in the Black's Ford area.

The results obtained by performing the Card test in the field were consistent with the results obtained for the Card test at the Diagnostic Laboratory, with the exception of two samples. The Card test considered inconclusive in the field (BF13009) was considered positive when completed at the Diagnostic Laboratory. Another sample (BF13039) was considered to be positive when run in the field, but negative when run at the Diagnostic Laboratory (Table 2). Interpreting the results from the Card test is subjective and based on the appearance of how the serum reacts with an antigen. Elk in particular can have inconsistent reactions when utilizing this test, as demonstrated by the negative Card test results obtained in the field and in the lab for elk ultimately considered seropositive based on a panel of tests.

When the FP was completed in the field, either prior to release of the elk or at some time after releasing the elk, it consistently identified elk classified as being seropositive at the Diagnostic Laboratory. Base on these and previous results, the FP appears to be more predictive of positive elk in the field than the Card test. Future field testing efforts will strive to utilize the FP test on all elk captured, when possible.

Table 2. Comparison of Card and FP test results from testing performed in the field and Diagnostic Laboratory (Lab) for elk classified as reactors to *B. abortus* based on a panel of tests conducted at the Diagnostic Lab.

Animal ID	Sero-status	Card –Field	Card – Lab	FP – Field	FP -Lab
BF13001	Reactor	Negative	Negative	Not Tested	Positive
BF13002	Reactor	Positive	Positive	Positive	Positive
BF13004	Reactor	Positive	Positive	Positive	Positive
BF13009	Reactor	Inconclusive*	Positive	Not Tested	Positive
BF13021	Reactor	Negative	Negative	Positive**	Positive
BF13027	Reactor	Positive	Positive	Positive	Positive
BF13039	Reactor	Positive	Negative	Positive	Positive
BF13061	Reactor	Positive	Positive	Positive	Positive
BF13073	Reactor	Positive	Positive	Positive**	Positive
RM13006	Reactor	negative	Positive	Positive	Positive

* Card test result was considered inconclusive in the field. The elk was radio-collared as a possible seropositive animal.

** FP result competed in the field after elk had been released due to concerns over elevated body temperature and the length of time it takes to complete the test.

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